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Dissecting the 'doom loop': the bank-sovereign credit risk nexus during the US debt ceiling crisis

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Abstract

Political events matter in economics. This paper uses the 2011 political standoff over the rise of the US debt ceiling to characterise an instrument that is then used to estimate the impact of sovereign on bank credit risk. Results show that a 100 basis points increase in the US sovereign default risk implies a 41 basis points increase in bank credit risk; this effect is about three times larger than the corresponding effect of bank default risk on sovereigns. Finally, calculations suggest that during the first two quarters of 2011, as a consequence of the debt ceiling crisis, US bank funding costs increased by approximately 18 basis points.

JEL Codes: G18; G21; G28;
Keywords: Banks, Sovereign default risk

1. Introduction

The 2008 financial crisis was so disruptive for the financial system to force many sovereigns to re-capitalise their banks. In many instances, the implementation of state bailout programs put public finances under severe strain, ultimately increasing government default risk. If in the onset of the global financial crisis credit risk spread primarily from banks to governments, the 2010 European sovereign debt crisis was a powerful reminder that credit risk can also go the opposite way, as the exposure to sovereign bonds of troubled economies represented a significant source of credit distress for financial intermediaries. Despite improved financial conditions, the characterisation of the link between sovereign and bank credit risk is still today an important

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ingredient for understanding financial and fiscal vulnerabilities; the political turmoil that followed the Italian elections in March 2018 was accompanied by a repricing of sovereign risk and by a sharp sell-off in Italian sovereign bond markets. Debt market tensions then spilled over to financial intermediaries, evidence of a resurgent doom *doom loop*, the sovereign−bank credit risk nexus.

Higher sovereign default risks can transfer to banks via a number of channels. First, mark-to-market valuations of sovereign bonds generate impairment losses on trading books that weaken bank balance sheets (market risk). Second, a higher default risk may also require making provisions for losses on sovereign assets held to maturity. Third sovereign stress transmits to banks by reducing the credit quality of other banks assets that are indirectly affected by a sovereign default. Theoretical representations of bank-sovereign credit linkages are numerous. For example sovereign−bank feedback loop models are discussed by Acharya et al. (2014), Brunnermeier et al. (2016), Cooper and Nikolov (2013), Farhi and Tirole (2016), Gennaioli et al. (2014), and Leonello et al. (2014). Empirical investigations are no less profuse, but in general only mildly try to deal with the endogeneity issue entailed in this relationship; Altavilla et al. (2017) use monthly data for euro area banks from 2007 to 2015 to find that, in vulnerable countries, publicly owned, recently bailed out banks significantly amplified the transmission of risk from the sovereign via subdue lending. Alter and Schüler (2012) investigate the interdependence of the default risk of several euro area countries and their domestic banks, they find that in the period before bank bailouts the contagion disperses from bank credit spreads to sovereign credit default swaps (CDSs). Alter and Beyer (2014) try to quantify spillovers between sovereign credit markets and banks in the euro area. De Bruyckere et al. (2013) investigate contagion between bank and sovereign default risk in Europe over the period 2007 to 2012. Albertazzi et al. (2014) examine the implications of the sovereign debt tensions on the Italian credit market during the sovereign debt crisis. The authors find that the sovereign spreads significantly affects the cost of credit for firms and households and exerts a negative effect on loan growth. Similar results are found by Zoli (2013). De Marco (2017) and Popov and Van Horen (2013) use data from the EBA stress test to show that banks with larger sovereign exposure raised anding rates more sharply and decreased their access to wholesale funding. Acharya et al. (2018) use syndicated loan data to investigate the loan contraction caused by the sovereign crisis. Finally, Becker and Ivashina (2017) find crowding out effects due to high bank exposure to sovereigns on lending to corporates.

However, the inherit identification problem that characterises the simul-

taneous relationship between sovereign and bank credit risk has hampered a convincing quantification of the causal relationship between the two. This paper tries to fill this gap by proposing a simple identification scheme based on instrumental variables. The idea is to use the political events relating to the 2011 US debt ceiling crisis as a base for the characterisation of an instrument for US sovereign credit risk. Recent events, including the U.K. 2016 referendum on the EU membership, are potent reminders that political events may have severe impact on financial markets and macroeconomics variables. This paper shows that the political struggle opposing the White House and the US Congress for the rise of debt ceiling in the first quarters of 2011 had a non-negligible impact on US government CDSs. Exogenous to innovations in bank credit risk, the events characterising the debt ceiling crisis provide a source of variation for the US sovereign default risk that can be used for the identification for the causal effect of sovereign on bank default risk. The discussion that follows describes how to construct an instrument for sovereign default risk out of the debt ceiling political timeline and presents results for the estimated impact of government credit risk on bank CDSs. The last section discusses conclusions and policy implications.

2. Empirics: anatomy of the bank-sovereign credit risk relationship

Let us consider the following model describing the relationship between bank and sovereign credit risk

$$s_t = \beta_s q_t + \gamma Z_{s,t} + v_{s,t} \tag{1}$$

$$q_t = \beta_q s_t + \delta Z_{q,t} + v_{q,t} \tag{2}$$

where s_t is a measure of default risk for banks at time t, q_t is the corresponding measure for sovereigns; $Z_{s,t}$ and $Z_{q,t}$ are two vectors of exogenous controls, possibly including a constant. This representation essentially states that the two endogenous variables, q_t and s_t, are jointly determined in a simultaneous equations model. If $Z_{s,t} = Z_{q,t} = Z_t$ the system is unidentified and a simple OLS estimation of Equation (1) would produce biased and inconsistent estimates of β_s – the target coefficient measuring the impact of sovereign on bank credit risk. However if $Z_{s,t} \neq Z_{q,t}$, meaning if the set of exogenous variables is not the same for both equations and if there is at least one element z_t^i in $Z_{q,t}$ not in $Z_{s,t}$, the identification of Equation (1), and thus of β_s, is possible. The conditions that must hold for each

generic excluded instrument z_t^i in $Z_{q,t}$ are $E(z_t^i, u_t) = 0$, $E(z_t^i, v_t) = 0$ and $E(z_t^i, q_t) \neq 0$, which implies $\delta^i \neq 0$.

In practice, it is not straightforward to think of an exogenous determinant of sovereign credit risk that is not also a determinant of bank default probability. Traditional identifying assumptions based on covariance restrictions are unlikely to hold in this case, as inconsistent with the simultaneous nature of the relationship between the two endogenous variables. This paper proposes to solve the identification problem entailed in Equations (1) and (2) with an instrumental variable approach. The following sections describe how we can exploit a political event, the 2011 US political struggle referred as the *debt ceiling crisis*, for the construction of an instrument of sovereign credit risk that is exulted from Equation (1) but that had an impact on sovereign default risk. Calling this instrument z_t^j, the crucial intuition justifying the exclusion restriction $E(z_t^j, v_t) = 0$ is that the disagreement between the House of Representatives and the White House over the possibility of an increase of the US debt ceiling was not affected by credit conditions in the banking system.

3. Identification, the debt ceiling political timeline

On November 2nd, 2010 the Republicans won control of the House of Representatives on a promise to scale back government spending and tackle the high fiscal deficit. This event set the stage for a political battle between Democrats and Republicans that took place six months after and that brought the US government few steps away from default. The fulcrum of this political struggle was the rise of the US debt ceiling, a legislative limit on the amount of national debt that can be issued by the US Treasury. In January 2011 the Treasury estimated that US borrowing needs could push the amount of debt past the legal borrowing limit of 14.294 trillion USD sometime between March 31 and May 16. Failing to raise the debt ceiling before these dates would cause a technical default for the US Government. The timeline of this political crisis developed along a number of crucial votes, key meetings and political declarations having an impact on the short-term default risk for US government bonds (Table .1). Within the framework of the analysis developed in this paper, the variation induced by this political clash on US government CDSs is used as an exogenous source of variation for US sovereign default risk. This in order to solve the identification problem described by Equation (1) and (2). The exclusion restriction required for a correct IV identification strategy holds under the assumption that the

political clash between Republicans and Democrats was not affected - at least on daily frequencies - by other economic or financial factors.

The first step for the construction of an instrument from the timeline reported in Table .1 is to interpret the expected effect of each episode on US sovereign default; the second column in Table .1 provides a description of each event in the timeline, the last column shows the expected impact on US government CDSs. The expected impact on US sovereign default risk is postulated under the premise that persistent or widening disagreement among the parties hampered the achievement of the political agreement necessary for rising the debt ceiling and, through this, endanger the ability of the US government to stay solvent.

Figure .1 shows the evolution of 1,2 and 5 year, USD denominated, US government CDSs over the first half of 2011, against key dates identified in Table .1; red (green) vertical lines mark episodes that are interpretable as increasing (decreasing) credit risk. From a graphic inspection two facts stand out: first, US governments CDSs appear to spike in some crucial dates identified by the debt ceiling timeline. Second, the price of short term CDSs appears to be more sensitive than the one of 5 year contracts. Also, volatility in CDSs markets increases significantly after May 2011, when the debt ceiling debate takes the connotation of a crisis. From July to the beginning of August 2011 an inversion the CDS curve can be observed, implying a higher cost for buying credit protection in the short and showing markets' fear for a shock default.[1]

The construction of a numeric variable form the timeline presented in Table .1 is not straightforward; the simplest choice is to create a dichotomous variable z_1 (z_2) assigning a value of one to each date identifying events showing disaccord (accord) among Democrats and Republicans about rising the debt ceiling, and zero otherwise. An alternative is the construction a unique variable (let us call it z_3) assigning two possible values (-1 and 1) to events signalling accord and disaccord among the parties. Thus z_3 is defined as z_2 - z_1. Both these solutions are tested in the empirical specifications that follow. In both cases the resulting variables do not convey the *intensity* that diverse events in the timeline may have on US CDSs. In the second case (a unique instrument) symmetry is also assumed between events increasing and reducing US government CDSs. This condition does not affect the correct assessment of the coefficient β in Equation (1), while the use of a unique instrument brings the benefit of an accrued estimation efficiency.

[1]This was the first ever recorded inversion of the US sovereign CDS curve.

4. Estimation and results

The baseline specification is

$$s_t = \beta_s q_t + \phi_s q_{t-1} + \rho_s s_{t-1} + \gamma \Omega_{(t;t-1)} + \zeta_t \tag{3}$$

where s_t is a variable representing 5 year bank CDSs. This variable is computed as the median of 5 year, USD CDSs for the first 6 US banks by asset size;[2] q_t is the 5 year, USD US government CDS.[3] Ω is a vector of controls including the log of the VIX index and the Baa Aaa rated corporate bond spread, two proxies for investor risk appetite and kwon determinants of the price of insurance against default risk. The model also includes a set of time fixed-effects defined a quarterly frequency. The use of quarter fixed-effects enable to control for low frequency macroeconomic variables that may affect both dependent and independent variables. One lag of two endogenous variables s_t and q_t and of the vix index are introduced to eliminate serial correlation.

Regression results are reported in Table .2. The first column shows results for a simple OLS estimation, the second and forth columns show results for an IV-GMM estimation where key identifying conditions are obtained using the set of instruments discussed above. Columns 3 and 5 show corresponding first step estimations. In all IV specifications, the instrument performs well and identification appears to be solidly achieved: the Kleibergen-Paap (K-P) rank LM underidentification statistics suggests the existence of significant correlation between the instrument and the endogenous variable; at the same time, a high value for the K-P Wald F-statistic allows to rule out the possibility that the estimated IV coefficient could be biased toward the corresponding OLS due to weak identification. The target coefficient β identifying the effect of government CDS on bank credit risk is positive and significant in all IV specifications. A quantitative assessment suggests that a 100 basis points increase in the US sovereign default risk implies a 41 basis points increase in median bank credit risk.[4] This effect

[2] Among these JP Morgan Chase & Co., Bank of America, Wells Fargo & Co., Citigroup Inc., Goldman Sachs and Morgan Stanley, representing over 60 percent of the overall US banking industry by assets in 2017.

[3] The choice of using USD denominated CDS with respect to the more liquid EUR denominated, responds to the necessity of eliminating possible exchange rate effects form the analysis. Similarly, the use of 5 year CDS, with respect to 1 or 2 year contracts, that, as shown, appeared to be more volatile during the the period of analysis, is more appropriate to eliminate the possible impact of term spreads.

[4] Considering the model with a single instrument.

compares with an effect of 52 basis points found by a simple OLS estimation. Considering point estimates this means over 3/4 of the observed correlation between bank and sovereign CDS is due to the impact of the latter on the former.

Table .3 provides some robustness tests. The first column in the table shows the benchmark specification. The second model uses monthly (instead of quarterly) time fixed effect. The rationale for the introduction of monthly fixed effect is to control for unobservable variables at higher (than quarterly) frequencies. In the third model, estimation is restricted to a smaller time spell around the first 2 quarters of 2011 (from November 2010 to August 2011).[5] The instruments are in fact defined only in a narrow time window (February to August 2011) and it is compelling to assess estimation results within this limited time frame. Despite the introduction of a set of lagged endogenous and exogenous variables in the baseline specification, the use of daily frequencies for estimation leaves the possibility of residual serial correlation. The last column of Table .3 tests the robustness of results to the use of standard errors robust to arbitrary serial correlation. The key result survive this battery of tests. The use of month-fixed effects reduces the point estimate of the target coefficient to 0.29.

5. The effect of bank default risk on sovereign's

The previous sections described how Equation (1) can be identified by using an *ad hoc* instrument constructed using the timeline of the US debt ceiling crisis. Using these results and under some conditions, there is also a chance to identify Equation (2). Let us consider again the system represented by Equation (1) and (2). The reduced form errors are

$$\begin{bmatrix} s_t \\ q_t \end{bmatrix} - A^{-1}\phi Z_t = A^{-1} \begin{bmatrix} v_{s,t} \\ v_{q,t} \end{bmatrix} \tag{4}$$

where $A = \begin{bmatrix} 1 & -\beta_s \\ -\beta_q & 1 \end{bmatrix}$. If the structural errors of Equations (1) and (2) are uncorrelated, that is, if $cov(v_{s,t}, v_{q,t}) = E(v_{s,t}, v_{q,t}) = 0$, the reduced form covariance matrix for the system of equations is

[5] The use of a longer time sample for the baseline estimation originates from the willingness of comparing the IV coefficient with a corresponding OLS estimate assessed over a sufficiently long period of time.

$$\hat{\Theta} = \frac{1}{(1-\beta_s\beta_q)^2}\begin{bmatrix}\beta_s^2\sigma_q^2+\sigma_s^2 & \beta_s\sigma_q^2+\beta_q\sigma_s^2 \\ & \sigma_q^2+\beta_q^2\sigma_s^2\end{bmatrix} \tag{5}$$

If no knowledge about any of the structural parameters is available, the problem of identification for Equations (1) and (2) can be seen as the problem of finding a unique solution to a system of three quadratic equations - linking the structural parameters and the known moment conditions to the reduced form covariance matrix - comprising four unknowns: the two structural parameters β_s and β_s and the two structural errors with variance σ_s^2 and σ_q^2. However, the ability to retrieve β_s from the instrumental variable estimation reduces the number of unknown to three. The possibility of obtaining a unique solution to this system of equations in this case relies on the introduction of trivial variance restrictions (such a positive value for the structural variances) which may be enough to rule out one pair of solutions for the system. The solution to the problem of identification of Equation (2) can also be seen as follows: as the identification of Equations (1) via instrument variables allows the identification of structural errors $v_{s,t}$ which can then be considered as predetermined in the identification of Equation (see Lahiri and Schmidt (1978), Hausman and Taylor (1983) and Hausman et al. (1987) for more details).

Results for the key parameters in both equations Equation (1) and Equation (2) are reported in Table .4. The implied impact of bank CDSs on sovereign credit risk is about 0.138, a value that corresponds to about a third of the impact of sovereign on bank credit risk.

6. The cost of political uncertainty

The buyer of a credit swap receives a given contingent amount following a credit event, such as a default. The contingent amount usually corresponds to the difference between the face value of the underlying bond and its market value at the time of default.[6] As discussed in Duffie (1999) and Hull and White (2000) if both CDS and cash bonds price default risk equally and subject to possible arbitrage imperfections,[7] the spread on the risky bond over a risk-free should equal the CDS price.

[6]The principal amount minus the recovery rate times the sum of principal and accrued interest on the reference obligation

[7]The spread on a par fixed-coupon risky bond over the par fixed-coupon risk-free bond exactly equals the CDS price if the payment dates on the CDS and bond coincide, and

Subject to the arbitrage imperfections the following approximate arbitrage relation between CDS and credit risk spreads should hold:

$$s_t \approx y_t - r_t \tag{6}$$

Estimates of the impact of sovereign credit risk on bank CDSs obtained in the previous sections can the be used for a quantification of the additional financing cost that the financial sector suffer following an increase in government credit risk. In detail, the overall impact of the debt ceiling debate on bank 5-year CDSs can be retrieved by looking at the projection of the instrument identifying on disagreement among parties (z_1) on US government CDSs times the estimated impact of US sovereign on bank credit risk. Using estimates from Model (2) in Table .2. In a back of the envelope calculation the impact of the disagreement among the two US parties on US government CDSs is 46 basis points,[8] multiplying this figure times the estimated impact on bank CDSs (0.385) we obtain an overall impact on bank CDSs of about 18 basis points. That is to say that US bank cost of capital has increased of about 18 basis points over the risk free rate as a consequence of the debt ceiling crisis. A similar figure can be obtained using Model (3) in Table .2.

7. Conclusions

This paper proposed an empirical characterization of the relationship between sovereign and bank credit risk. The core of the empirical strategy gravitated around the construction of an instrument for US sovereign default risk, from the timeline of the US 2011 debt ceiling crisis. The use of a source of variation for sovereign CDS that is exogenous to bank credit risk allows the identification the causal impact of an increase of sovereign credit risk on bank default probabilities. From a quantitative standpoint, an increase of 100 basis points in the US sovereign credit risk increases bank CDS by about

recovery on default is a constant fraction of face value (Houweling and Vorst (2002)); this is rarely the case. Also physically settled CDS prices may contain CTD premia, and the arbitrage relation that should keep the two prices together may rely on short selling the cash bond, possibility that is not always costless and indeed is sometimes not even possible in illiquid bond markets. Nevertheless, Duffie (1999) and Hull and White (2000) show that the relationship between CDS prices and the difference between corresponding bond yields the the risk free tend to be reasonably accurate for assets trading close to par when interest rates are not high and yield curves are relatively flat, as was the case of the sample period used in this analysis.

[8] 0.051 x 9 episodes defining z_1.

41 basis points. The corresponding impact of bank CDS on US default risk is instead 14 basis points. Two main results stand out from the analysis: first, the relationship between bank and sovereign credit risk is primarily driven by the effect of sovereign on bank. Second, almost half of any sovereign credit risk shock is passed on to bank funding costs.

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Table .1: Debt ceiling timeline: How U.S. debt talks spiraled into crisis

Date	**Description**	**Interpretation**	**Expected effect on US Gov. CDS**
November 2, 2010	Republicans win control of the House of Representatives on a promise to scale back government spending and tackle budget deficits that have hovered at their highest levels relative to the economy since World War Two.	Framework	(N/A)
January 6, April 4, and May 2, 2011	Treasury Secretary Timothy Geithner sends a letter to Congress urging lawmakers to act soon to increase the debt ceiling, warning that failure to do so would be disastrous for the economy. In January the Treasury estimates that U.S. borrowing needs could push the amount of debt past the legal borrowing limit of 14.294 trillion sometime between March 31 and May 16.	Framework: the debt ceiling crisis starts	(N/A)
January 28, 2011	Moody's Investors Service states that it may place a "negative" outlook on the AAA rating of US debt, as the country's budget deficit widened.	Not strictly political thus excluded from the analysis	(N/A)
February 15, 2011	President Obama presented his budget proposal for fiscal year 2012 on February 14. The following day the the U.S. House Committee on the Budget, strongly criticises the budget proposal with a written letter for not doing enough to rein in the rapidly expanding US deficit.The Senate will reject the budget proposal on May 25.	Initial evidence of disagreement between the parties	*Positive*
April 3, 2011	Republican Sen. John Cornyn, member of the Senate Budget Committee, says he will not vote to raise the debt ceiling unless it's accompanied by systematic reforms to address long-term spending and the national debt, voicing support for a balanced-budget amendment to the Constitution as a way to ensure the federal government lives within its means "instead of spending money we don't have."	Initial evidence of disagreement between the parties	*Positive**
April 8, 2011	Democrats and Republicans narrowly avert a partial shutdown of the federal government, agreeing on a budget deal and a short-term funding extension a little more than an hour before the clock strikes midnight and time runs out. The new funding extension, which cuts spending by 2 billion USD, will last through the next week.	Difficult interoperation: the attainment of an agreement partially diffuse the risk of a default, however the effect is only shot lived and the timing in which the agreement was reached underscores the political distance between the two parties	*Ambiguous*

Table .1: Debt ceiling timeline (Cont.)

Date	Description	Interpretation	Expected effect on US Gov. CDS
April 15, 2011	On a party-line vote 235-193, the House of Representatives passed the Republican 2012 budget proposalaimed to reduce total spending by 5.8 trillion USD and reduce total deficits by 4.4 trillion USD over 10 years compared to the current-policy baseline.The measure, which Obama opposes, includes a radical overhaul of Medicare and Medicaid and it has virtually no chance of clearing the Democratic-controlled Senate.	Difficult interpretation: while showing commitment toward finding a solution, the vote in the House of Representatives, also displays the unwillingness of Republicans to compromise and find a shared solution with Democrats. But a shared solution is necessary given the Democratic-controlled Senate.	*Ambiguous*
April 18, 2011	Standard & Poor's Ratings Services revises its outlook on the US to negative due to recent and expected further deterioration in the US fiscal profile, and of the ability and willingness of the US to soon reverse this trend. With the negative outlook, S&P believed there is a likelihood of at least one-in-three of a downward rating adjustment within two years.	Not strictly political thus excluded from the analysis.	(N/A)
May 16, 2011	The debt ceiling is reached. Treasury Secretary Timothy Geithner issued adebt issuance suspension period, directing the Treasury to utilise "extraordinary measures" to fund federal obligations.	Not clear interpretation: having reached the debt ceiling stresses the urgency of action, however the extraordinary measures adopted by the Treasury buy more time for reaching an agreement.	*Ambiguous*
May 18, 2011	Bipartisan deficit-reduction talks among the "Gang of Six" high-profile Senators are suspended when RepublicanTom Coburndrops out.	Evidence of disagreement between the parties; a bipartisan solution is the only viable option given the split in the Congress.	*Positive*
May 24, 2011	House Republicans says that they would allow a vote next week on an increase in the federal debt ceiling with no strings attached, in order to see it defeated and show Democrats that no increase in federal borrowing authority can be enacted without significant spending cuts. Calling the vote a stunt, leading Democrats said that having a debt-ceiling vote that was intended to fail was irresponsible and could rattle an already anxious financial community.	Evidence of persistent disagreement between the parties.	*Positive*
May 25, 2011	The Senate rejected both the Republican House budget proposal, by a vote of 57-40, and the Obama budget proposal, by a vote of 97-0.	Evidence of persistent disagreement between the parties.	*Positive*

Table .1: Debt ceiling timeline (Cont)

Date	**Description**	**Interpretation**	**Expected effect on US Gov. CDS**
May 31, 2011	The House voted on a bill to raise the debt ceiling without any spending cuts tied to the increase. The bill, which would have raised the debt ceiling by 2.4trillion USD, failed by a vote of 97-318. Democrats accused Republicans of playing politics by holding a vote they knew would fail.	Evidence of persistent disagreement between the parties.	*Positive*
June 23, 2011	Biden's negotiations on the debt ceiling were helted when both Eric Cantor and Jon Kyl walk out over disagreements on taxes.	Evidence of persistent disagreement between the parties.	*Positive*
June 30, 2011	The Senate plans to forgo its scheduled recess for the week of July 4th to work on legislation to raise the debt ceiling and cut the deficit. Senate Majority Leader Harry Reid announces the Senate will take the Independence Day holiday off but will return to work on July 5 after Obama criticises lawmakers and urges them to cancel vacations. Democratic legislators discuss a scaled-back deal that would avert default but force Congress to tackle the debt ceiling issue again before the 2012 elections.	The episode shows the commitment of the Senate to reach an agreement.	*Negative*
July 7, 2011	After hosting lawmakers at White House, Obama says Republicans and Democrats are still far apart on many issues but that all agree on the need to raise the debt ceiling.	Evidence of persistent disagreement between the parties.	*Positive*
July 9, 2011	Boehner says a "grand bargain" is out of reach because Republicans will not accept the tax increases Democrats are demanding, and he calls for a more modest 2 trillion USD package that would rely mostly on spending cuts.	Evidence of persistent disagreement between the parties about the "grand bargain", involving savings up to 4 trillion USD; however Boehner declaration shows commitment to find a more limited deal.	*Ambiguous*
July 10, 2011	President Obama meets with congressional leaders at the White House. At one point, the talks get heated between House Majority Leader Eric Cantor and the President. Multiple sources, speaking on condition of anonymity, say President Obama tells the gathering that "this could bring my presidency down," referring to his pledge to veto any short-term extension of the debt ceiling. Sources say he vows, "I will not yield on this." Cantor tells reporters after the meeting that he proposed a short-term agreement to raise the federal debt ceiling, a position President Obama has previously rejected.	Evidence of persistent disagreement between the parties	*Positive**

Table .1: Debt ceiling timeline (Cont.)

Date	Description	Interpretation	Expected effect on US Gov. CDS
July 19, 2011	The Gang of Six resurfaces with a deficit reduction plan that proposes 3.75 trillion USD in savings over 10 years and contains 1.2 trillion USD in new revenues. The Republican Majority in the House brought theCut, Cap and Balance Act (H.R.2560),their proposed solution to the crisis, to a vote. They passed the bill by a vote of 234-190, split closely along party lines: 229 Republicans and 5 Democrats 'for', 181 Democrats and 9 Republicans 'against'; it was sent to the Senate for consideration. The Bill authorised that the debt ceiling be raised by 2.4 trillion USD afteraBalanced Budget Amendmentwas passed by Congress.[2]	Evidence of progress toward the rising the debt ceiling	*Negative*
July 21, 2011	Obama and Boehner are reported to be discussing a 3 trillion USD deficit-cutting deal. Obama stresses some revenues will need to be included in any accord. Obama meets with congressional Democratic leaders at the White House, but there are no reports of a breakthrough.	Despite the efforts between the two parties, no agreement is reached	*Positive*
July 31, 2011	Obama announces a deal between his administration and congressional leaders has been reached. The agreement, which still requires congressional approval, proposes a two-stage process. In the first stage, it includes 917 billion USD in spending cuts and other deficit reduction now, as well as a 900 billion USD increase in the debt ceiling. In the second stage, a special joint committee of Congress will recommend further deficit reduction steps totalling 1.5 trillion USD or more by the end of November, with Congress obligated to vote on the proposals by the end of the year.	Solution to debt ceiling crisis approaches.	*Negative**
August 1, 2011	The U.S. House passes the debt ceiling deal that the White House and congressional leaders reached the previous day. The Senate will approve the measures the following day.	The debt ceiling crisis is over.	*Negative*

[1]The CBO analysis, released in April 2011, estimated that the budget would increase total deficits over 10 years by 2.7 trillion USD: from 6.7 trillion USD of the March 2011 baseline to 9.4 trillion USD with the proposed budget. [2]Since Constitutional amendments require a two-thirds majority vote in both chambers of Congress to pass, a vote for a Balanced Budget Amendment would require more support than the Cut, Cap and Balance Act bill achieved in the House vote. *Event happened outside trading hours; effect imputed on the following Monday. This timeline constructed using the online news archives of AFP, CNN, the New York Times, the Los Angeles Times and Reuters.

Figure .1: US government CDSs during the debt ceiling crisis.

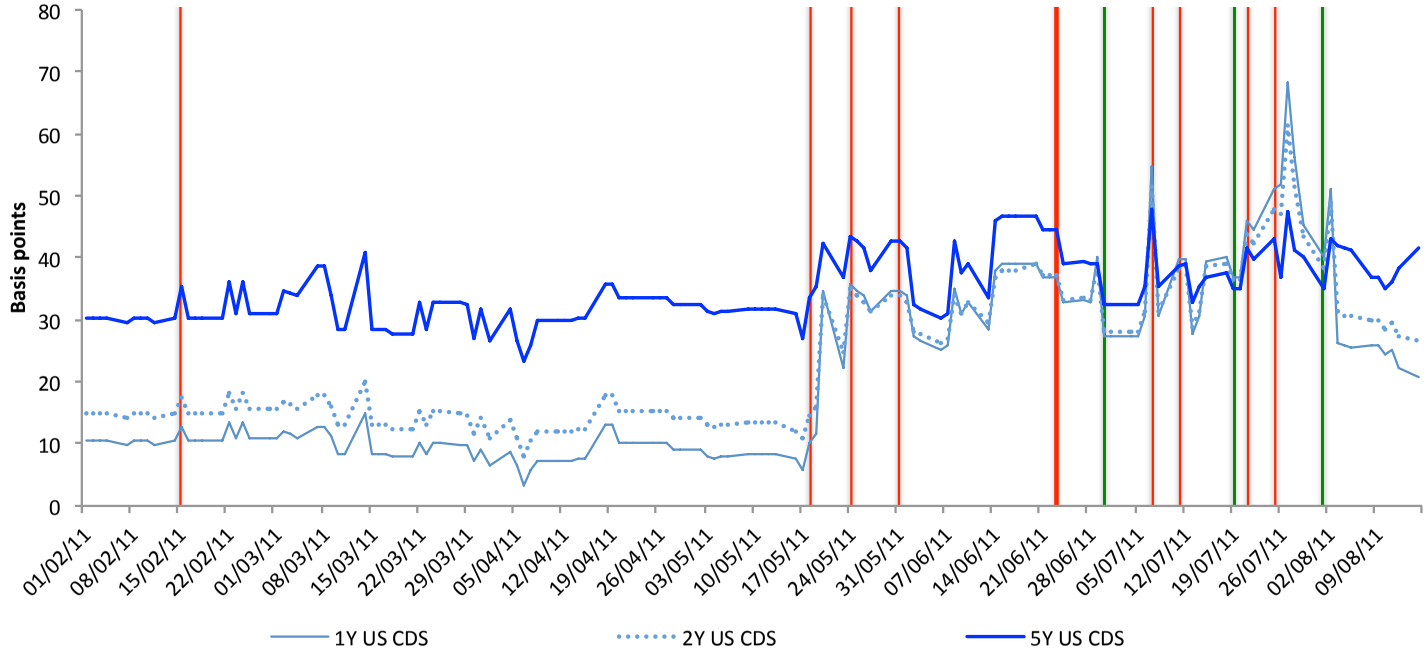

Table .2: Bank CDS and government credit risk

	OLS	IV			
	(1)	(2)	(3)	(4)	(5)
	Bank CDS	Bank CDS	Gov.CDS	Bank CDS	Gov.CDS
Gov. CDS	0.519**	0.385*		0.410*	
	(0.185)	(0.235)		(0.237)	
L.Bank CDS	0.904**	0.913**	-0.002	0.904**	-0.002
	(0.029)	(0.029)	(0.004)	(0.029)	(0.004)
L.Gov. CDS	-0.478**	-0.365**	0.917**	-0.378**	0.917**
	(0.163)	(0.224)	(0.023)	(0.225)	(0.022)
VIX	0.593**	0.595**	0.016	0.594**	0.016
	(0.063)	(0.063)	(0.013)	(0.063)	(0.013)
L.VIX	-0.449**	-0.449**	-0.009	-0.450**	-0.009
	(0.062)	(0.062)	(0.012)	(0.062)	(0.012)
Baa-Aaa Corporate Bond Spread	0.029	0.031	0.004	0.029	0.003
	(0.056)	(0.056)	(0.012)	(0.056)	(0.012)
z_1 $(disagreement)^1$			0.051**		
			(0.012)		
z_2 $(agreement)^2$			-0.044**		
			(0.011)		
z_3 $(z_1 - z_2)$					0.049**
					(0.009)
Underidentification test[3]			0.0105		0.0025
Weak identification test[4]			19.030		30.640
Month FE	Yes	Yes	Yes	Yes	Yes
Observations	1043	1043	1043	1043	1043

The table presents the regression results for the relationship between bank and sovereign 5 year CDSs. The first equation shows results for a standard OLS regression, models 2-4 and 3-5 are respectively the second and first step regressions of IV-GMM models where US sovereign CDS are instrumented with a variable constructed from the calendar dates of the 2010 US debt ceiling crisis. Daily frequencies from 01-01-2008 to 30-12-2011. Robust standard errors in parenthesis. [1] the first instrument is a dummy variable identifying dates characterised by events denoting political *disagreement* over the increase of the debt ceiling.[2]the second instrument identifies all dates characterised by events denoting political *agreement* over the increase of the debt ceiling [3]Chi-sq(2) P-val. [(4)]Stock-Yogo critical values for % 10 maximal IV size is 19.93 for Model (3) and 16.38 for Model (5).* $p < 0.10$, ** $p < 0.05$.

Table .3: Bank CDS and government credit risk, robustness

	(1) Bank CDS	(2) Bank CDS	(3) Bank CDS	(4) Bank CDS
Gov. CDS	0.410*	0.295*	0.436**	0.410*
	(0.237)	(0.169)	(0.211)	(0.237)
L.Bank CDS	0.904**	0.830**	0.933**	0.904**
	(0.030)	(0.038)	(0.048)	(0.030)
L.Gov. CDS	-0.378*	-0.412**	-0.319**	-0.378*
	(0.225)	(0.181)	(0.151)	(0.225)
VIX	0.594**	0.613**	0.386**	0.594**
	(0.063)	(0.065)	(0.057)	(0.063)
L.VIX	-0.450**	-0.343**	-0.284**	-0.450**
	(0.062)	(0.065)	(0.057)	(0.062)
BAA-AAA Corporate Bond Spread	0.029	-0.116	0.082	0.029
	(0.056)	(0.093)	(0.054)	(0.056)
Fixed-effects	Quarter	Month	Quarter	Quarter
Time Sample	01/08-12/11	01/08-12/11	11/10-08/11	01/08-12/11
Serial Correlation Robust SE	No	No	No	Yes
Observations	1043	1039	159	1043
Adjusted R^2	0.886	0.756	0.935	0.886

The first model represents the baseline specification, the remaining equations test result robustness to different time fixed effects (Model 2), time sample (Model 3), and specification for the standard error. Daily frequencies from 01-01-2008 to 31-10-2011. Robust standard errors in parenthesis.
* $p < 0.10$, ** $p < 0.05$

Table .4: Bank sovereign credit risk nexus: structural parameters

Paramter	Structural estimate
Effect of Government CDSs on banks's (β_s)	0.410
Effect of bank CDSs on government's (β_q)	0.138
Variance of government CDSs (σ_s)	0.00044
Variance of bank CDSs (σ_q)	0.00052